Plastic shrinkage cracking of blended cement concretes in hot environments

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Abstract: This paper reports results of a study conducted to evaluate plastic shrinkage cracking of concrete made with varying dosages of several pozzolanic materials, such as fly ash (20, 30 and 40%), silica fume (5, 10 and 15%) and blastfurnace slag (50, 60 and 70%). These concrete specimens were exposed to hot-humid and hot-dry environments. The effect of these environmental conditions on plastic shrinkage cracking was evaluated. The rate of water evaporation in the blended cement concrete specimens was noted to be more than that in the plain cement concrete specimens. Further, bleeding in the blended cement concrete specimens was less than that in plain cement concrete specimens. The cumulative effect of these two parameters resulted in increased plastic shrinkage cracking of the blended cement concretes. Although cracks were observed earlier in the plain cement concrete specimens than in the blended cement concrete specimens, the total area of cracks in the latter cements was more than that in the former cements. The results of this study also indicate that relative humidity influences plastic shrinkage cracking of concrete significantly in comparison with the effect of the type of cement.